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Conversion of recoilless γ radiation into a periodic sequence of short intense pulses in a set of several sequentially placed resonant absorbers

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Abstract

© 2015 American Physical Society. An efficient technique for producing a periodic sequence of short nearly bandwidth-limited pulses of recoilless γ radiation via its transmission through an optically thick vibrating resonant absorber was demonstrated recently [Nature (London) 508, 80 (2014)10.1038/nature13018]. In this paper we extend the theoretical analysis to a case of multiple absorbers. We analyze a simple physical model describing control of spectral content of a frequency modulated γ radiation by adjusting the amplitudes and initial phases of spectral components, using the resonant absorption and dispersion in a set of several sequentially placed resonant absorbers. On the basis of analytical solutions, we determine the ultimate possibilities of the proposed technique.

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